

FIGS. 3A through 11C which are views illustrating a method to display cylindrical submenus according to an exemplary embodiment of the present general inventive concept.

[0073] Referring to FIG. 3A, a three dimensional (3D) cylindrical menu **310** representing menus on a surface of the 3D cylindrical menu **310** is displayed on a display **300**. In an exemplary embodiment, the display **300** offers a touch screen function. A user can rotate the 3D cylindrical menu **310** by stroking the 3D cylindrical menu **310** on the display **300** using a finger in upward and downward directions. If a user touches the display **300** at a location where a desired item is positioned in the 3D cylindrical menu **310**, the touched item is selected.

[0074] If a user rapidly strokes the 3D cylindrical menu **310** on the display **300**, the 3D cylindrical menu **310** is rotated rapidly in the stroke direction, and if a user slowly strokes the 3D cylindrical menu **310**, the 3D cylindrical menu **310** is rotated slowly in the stroke direction.

[0075] Referring to FIG. 3B, in response to a user touching on an item on the 3D cylindrical menu **310**, a 3D cylindrical submenu indicating associated submenu items appear on a surface of the submenu, which are generated and displayed separately (that is, in a non-overlapping format). In an example illustrated in FIG. 3B, a user selects the menu item "Music" from the 3D cylindrical menu **310** by touching the display **300**, and a 3D cylindrical submenu **320** having submenu items associated with the selected item "Music" are displayed separately at one side of the 3D cylindrical menu **310**. The user may stroke the display **300** displaying the 3D cylindrical submenu along upward and downward directions, and select a desired submenu item from the 3D cylindrical submenus.

[0076] The selected item from a 3D cylindrical submenu is displayed prominently in the center of the 3D cylindrical menu **310**, as illustrated. The item may be provided in a bold type font, or a block type font to emphasize the selected item, or large font, or capital font, or other font so that a user can recognize the item which has been selected.

[0077] The title of the menu that is currently activated may also be indicated and highlighted. In another embodiment, for example, as the 3D cylindrical submenu **320** having associated submenu items are activated and displayed as illustrated in FIG. 3B, the 3D cylindrical submenu is displayed more brightly or boldly than the 3D cylindrical menu **310**. Accordingly, a user can easily recognize that the 3D cylindrical submenu **320** is activated. Alternatively, the activated 3D cylindrical menu **310** may be represented in enlarged or bold or other highlighting fonts.

[0078] In these embodiments, the user can select items while viewing concurrently the parent menu and its associated submenu.

[0079] FIG. 3C is a view illustrating when a user selects a submenu item of the 3D cylindrical submenu **320**. That is, the user selects the menu item "Music" from the 3D cylindrical menu **310** and the submenu item "Track" from the 3D cylindrical submenu **320**.

[0080] When the user touches the display **300** to select the submenu item "Track" from the 3D cylindrical submenu **320**, a caption **330** of the selected menu and submenu item may be displayed on the display **300**. For example, as the caption **330** "Music>Track" is displayed on the display **300** in FIG. 3C, the user can recognize that the menu and submenu items "Music" and "Track" have been selected.

[0081] The method to display the 3D cylindrical submenu **320** separately has been described in detail with reference to FIGS. 3A through 3C.

[0082] Hereinbelow, a method to display right 3D cylindrical submenus **440** in an overlapping manner will be explained in detail with reference to FIGS. 4A through 4F. FIGS. 4A through 4F are views illustrating a method to display cylindrical submenus according to another exemplary embodiment of the present general inventive concept.

[0083] FIG. 4A is a view illustrating a display **400** displaying left and right icons **410** and **420** to indicate that there are submenus available to be formed at right and left sides of a 3D cylindrical menu **430**. Referring to FIG. 4A, the 3D cylindrical menu **430** includes a listing of stored multimedia files which may be a music file, a video file, or another type of multimedia file.

[0084] Referring to FIG. 4C, a music file may include an associated first group of submenu items including "Favorite," "Delete," and "Copy," and referring to FIG. 4E, a second group of submenu items including "Photo," "Back," and "Volume." The 3D cylindrical menu **430** is used to select the music file and the left and right icons **410** and **420** are selected to select the respective submenu from among these two groups of submenu items associated with the selected music file.

[0085] As illustrated in FIG. 4A, black triangles are provided at both sides of the 3D cylindrical menu **430** which are the left and right icons **410** and **420**. If the left and right icons **410** and **420** are selected, submenus corresponding to the left and right icons **410** and **420** may be displayed on either side of the 3D cylindrical menu **430**.

[0086] FIGS. 4B and 4C are views illustrating a method to select the right icon **420**. If a user touches the right icon **420** and strokes the menu along a leftward direction, the controller **140** displays the right side 3D cylindrical submenu **440**, including the first group of submenu items at the right side of the 3D cylindrical menu **430**. The right side 3D cylindrical submenu **440** may be displayed in an overlapping form with respect to the 3D cylindrical menu **430**.

[0087] FIGS. 4D and 4E are views illustrating a method to select the left icon **410**. If a user touches the left icon **410** and strokes the menu along a rightward direction, the controller **140** displays a left side 3D cylindrical submenu **450**, including the second group of submenu items at the left side of the 3D cylindrical menu **430**. The left side 3D cylindrical submenu **450** may be displayed in an overlapping form with respect to the 3D cylindrical menu **430**.

[0088] FIG. 4F is a view illustrating a process of performing a function corresponding to an item selected from the 3D cylindrical submenus **440** and **450**. Referring to FIG. 4C, if a user selects the "Delete" submenu item from the right side 3D cylindrical submenu **440**, a dialogue box **460** is displayed on the display **300** to ask whether a user intends to delete the music file. The 3D cylindrical menu **430** may remain displayed in its original form behind the dialogue box **460**.

[0089] As the right side 3D cylindrical submenu **440** is displayed in the above manner, it may seem to the user as though the user is pulling out the menus at will. Accordingly, the user can intuitively and easily use the right side 3D cylindrical submenu **440**.

[0090] FIGS. 5A through 5C are views illustrating a method to display cylindrical submenus according to an exemplary embodiment of the present general inventive concept.

[0091] FIG. 5A illustrates an embodiment where the 3D cylindrical menu **310** and the 3D cylindrical submenu **320** are displayed separately from the 3D cylindrical menu **310**. Referring to FIG. 5A, the 3D cylindrical menu **310** is formed apart from the 3D cylindrical submenu **320** where a predeter-